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away and the seeds scraped out and collected. After further drying, the flesh is sliced spirally from side to side, beginning at the stem end, in a strip 2.5 to 5 cm. in width. This coil, 1 to 1.5 m. long, is hung from a pole to dry in the sun. While it is still pliable, it is folded back and forth on itself into a bundle (*hamtebut'lled*), 30 to 45 cm. long, and bound with one end of the strip. This is set aside to dry thoroughly before it is placed in the storehouse for winter use. Squash so dried will keep through an entire year. Melons are also grown. 251

Sunflowers (*dk'lld*) are grown for their seed. Cotton (*Gossypium hopi* Lewton) is raised from seed obtained from the Hopi; the only use for this product is in the strike-a-light. The seeds of wild food plants are not planted; some, such as pigweed, grow in the fields. Peaches and figs, modern foodstuffs, are eaten fresh. Peaches are also torn in two and pitted, while figs are opened, before they are spread on the rocks to dry. 241 [249] [272] [251]

Two varieties of tobacco are known, *úvi*, and *kdbé'da„la'ni* (Coyote's tobacco; *Nicotiana trigonophylla* Dunal). Myth has it that the second was grown by Coyote for his own use. Both grow wild on the plateau and in the canyon above the village: their leaves are similar, but the smoke tastes somewhat differently, according to the natives. Tobacco (both varieties?) is grown only on the plateau. A mesquite tree is cut down and burned. The tobacco seeds are thrown into the dead ashes (the soil is not dug up). Willow is not used as a substitute. 249

Wild Food Products

These are a valuable adjunct to the food supply, especially from the autumn until spring during the residence on the plateau. During this period they lead a wandering life, families going off in the fall to a place where someone had reported piñon nuts lying plentifully on the ground; winter finds them to the east, hunting in the Coconino Basin, dropping down to the benches of the Grand Canyon in the spring for mescal, and so on. Women and children are sometimes left to gather seeds while the men go off to trade. 221 222 [462]

Mescal (the agave plant), which grows on the canyon benches, is ripe in May when the flower stalk is 30 to 60 cm. tall. The plant is severed entire by pounding a chisel-shaped buckthorn stick (*tdp'ó"l*) about 1 m. long, 3 cm. diameter, against its base. The outside leaves of the inverted plant are trimmed of their green portion with a special hatchet (*dqwidjd*). This consists of a broad stone blade set in a slot midway in the length of a short handle, 30 cm. long, (sometimes of piñon wood), where it is held fast with glue or pitch and by lashings. A load of [412] 252 [412]

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side, it is rolled up, set aside, and later worked as described above. As the skin contains considerable fat, it must be dried in the shade. A second tanning is then given, using the spinal canal marrow. 281

Tools

Fire Tools. Inasmuch as cooking is a day-long process there is usually a fire within easy reach. But fire may be readily obtained with palm drill or strike-a-light. 372

The firedrill (*o'ogádid*: *o'o*, fire) consists of hearth and drill. The hearth (*katu'pàrdg*) is a section of the dry flower stalk of bear grass (*Nolina microcarpa* S. Wats., *ák'tagádid*), which grows on the talus slopes. This is flattened on opposite sides and provided on one face with pits (*nu'dág*) adjacent to notches in one edge (Fig. 18). The drill (*gutá*) of dry mesquite root is straightened, trimmed, and rubbed down to a diameter of one centimeter. Beargrass and mesquite root are the best materials; others may be used, the only requisite being that they are

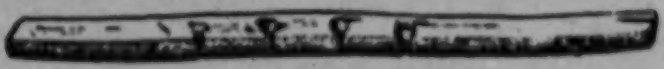

Fig. 18 (50.9-1234). A Firedrill Hearth.

thoroughly dry. Hearth and drill are made in two sizes. For ordinary uses about the camp, the hearth measured 25 cm. in length, the drill 60 cm. When traveling the drill is carried in the quiver, with the hearth in its own case tied to the outside. But by preference shorter sticks, each 15 cm. long, are carried together in a special case. The short drill is then substituted for the foreshaft of an arrow in order to lengthen it for use. The operator is usually seated with knees drawn up, holding the hearth on a flat stone beneath his feet. A pinch of sand is placed in the drill pan. The drill is rotated between the palms in the familiar manner, exerting considerable downward pressure; when the hands reach the lower end of the drill they are quickly returned to the top. The wood dust falls through the adjacent notch on to the stone; rubbed, dry cedarbark serves as tinder. A demonstration with a somewhat green drill took about a minute to produce a glowing coal. Obviously two men drilling together can reduce this time materially. The pumpdrill is not used.

The strike-a-light has a native form. A white stone (*ddgl'akwid*, pyrites?) is held, together with the tinder, in one hand, and struck with a flint knife. The only tinder used is cotton (*kádjdut*) grown from seeds

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372 obtained from the Hopi. It is braided into a thick cord (Adjdaedcfwaad) 30 cm. long, and drawn through a tube (the hind leg bone of a wildcat) of half its length. When wanted the charred end is pulled out of the tube which protects it from dampness. The tinder and stones are wrapped together in their own case.[1]

It is quite as convenient to carry a slow-match (akakwidd) when traveling (Fig. 19). This is a rope of rubbed cedarbark, 2 cm. diameter

Fig. 19 (30.2-1280). A Slow Match of Cedarbark Rope.

and nearly 2 m. long, tied at short intervals with yucca leaves. It is carried in a coil, the smouldering end being blown on from time to time.

There is no great discrimination among fuels in the canyon for all the available materials are inferior (cottonwood, willow, sagebrush, corncobs, etc.). In fact, this is assigned as one reason for leaving the canyon [221] in the winter; it is certainly too laborious to pack firewood from the [412] plateau. Fallen trees and dead limbs are broken with heavy stones.

[1] Compare a reed containing charred cotton found by Fewkes near the Verde Valley, fig. 373.

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Campfires on the plateau are not banked at night, but heaped with sufficient wood to last until morning. 372

Ladles. These are said to be made of mountain sheep horn (*wakwa-ni'i*) alone, although Cushing saw small wooden ladles.[1] The typical ladle (*wakwa'*) has a round, shallow bowl, 12 cm. in diameter, with a curved handle. A smaller dipper, 15 cm. long, has an oval bowl with a short handle (20ab). After the handle is hacked and trimmed to size, the horn is soaked and buried in wet sand from three to six nights or until it is fairly soft. The grease of the mountain sheep and the mountain lion are rubbed into the horn, which is warmed at the fire. The handle is then bent into shape. To form the bowl, the top of the horn is split, 321 415

Fig. 20 a (20.2-1888), b (20.2-1217). Mountain Sheep Horn Ladles.

the sides wedged apart with a stick, and the edges trimmed. The bowl is filled with dirt, carefully propped up, and laid aside for a week to harden. As these are used to serve hot liquids, the bowl relaxes to its original shape. The Hopi, who take these ladles in trade, cut disks from them, which they flatten and bore for spindle whorls.[2] [439]

Gourds. Gourds (*a'wale*), grown in the canyon, are infrequently used as water vessels. These are a long-necked variety, 25 cm. or less in diameter. The stem end of the neck is cut off square and stoppered with grass, crushed cedarbark, or a corncob.[3] A handful of kernels is placed in the new gourd and given an occasional shake to remove the loose fibers. 415

[1] Cushing, loc. cit. Ladles are widely distributed: Hopi and all other pueblos (Hough, (a), 278); Paiute examples in the Peabody Museum, Salem, Mass.; Wind River Shoshoni (Lowie, (b), 209.)

[2] The Mohave use similar gourds to carry grain on journeys (specimens in Museum of Anthropology, University of California). [171]

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Most Southwestern peoples, like the Havasupai, use a simple fire-drill, a single piece of wood. The composite drill, having a short fore-shaft of wood of a special sort set in the end of the drill, occurs in this area among the Navaho. The Hopi use it at least in their *New Fire* ceremony. Northward it is distributed among the Paviotso, Klamath, Modoc, Washo, Lemhi and Wind River Shoshoni, Crow, Green River Salish, and Snohomish or Snuqualmi.[1] The materials used might be compared. I note that the Havasupai use the flower stalk of bear grass for the hearth, the White Mountain Apache that of *Yucca baccata*, and the Navaho a soft stalk of a large weed. The Shivwits, like the Havasupai, use mesquite for the drill. With regard to the pits on the hearth, the Paviotso prescribe four as the standard number. Similarly of the Navaho hearth, it is said "small holes, sometimes four in number, were cut into it,"[2] and one Havasupai specimen (50.2-1224) has four holes, but this was not specified as standard for them. The Shivwits made pits all along the hearth. It may be that we have here a diffused trait; on the other hand, it may be nothing but an expression of the pattern number, four, obtruding itself on every occasion.

The slow-match, a long roll of cedar or sagebrush bark, is widely distributed through the western plateaus. It is used by the Havasupai and by the Navaho according to them (p. 226), Hopi, White Mountain Apache (?), Wind River and Lemhi Shoshoni, Klamath, Modoc, Thompson, and Nisqually.[3]

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171

Bark mats or blankets may be in general use throughout the plateaus. The smaller Havasupai type, woven spirally, is also found among the Navaho.[4] Reed mats are used instead by the Pima, Luiseño, Northern Shoshoni,[5] and Maidu.

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411
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As Mason and Wissler pointed out years ago the sinew-backed bow is found throughout the western plateaus, in the western Plains, and on the Pacific slope.[6] The following notes will help to define its range with greater precision (Fig. 28).

In the Southwest it is used by the Mescalero, Jicarilla, Southern Ute, Navaho, White Mountain Apache, and Havasupai.[7] There is a prehistoric sinew-wrapped bow from southern Colorado in the Museum

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[1] Hough, (a), 223; Fowke, (d), pl. 3; Lewis, (l), 223; (a), 199; (b), 214; Hough, (a), 236-243; Barrett, (a), 287; Mooney and Gardner, 15. Washo information from Dorothy R. H. Lewis, 1926.
[2] Franciscan Fathers, 65.
[3] Hough, (a), Pl. 20; Lewis, (l), 223; (a), 199; Chamberlin, (a), 35; Barrett, (a), 287; Teit, (a), 327; Mooney and Gardner, 15.
[4] Franciscan Fathers, 607.
[5] Russell, (a), 134; Sparkman, 210; Dixon, (a), 168; Lewis, (a), 134.
[6] Mason, O. T., (f); Wissler, (a), 139.
[7] Pettis, 169; Goddard, (b), 261; Hough, (a), 237; Letherman, 253; Mason, O. T., (f), 640, 668, Pl. 78, Fig. 2; Mooney, J. A., (b), 136; Bourke, (b), 87.

[Text continues on p. 160]

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That was one phase of the situation the Great Father had not thought out; neither had I. The old wife and her children would be the ones to go, and she had borne her share of trouble. I told him to keep both families, and give them equal care. I did not report his case to Washington, nor did I seek advice as to the best method for disposing of surplus wives and children.

The Indians said that Manakadja had first married the older woman, a member of his tribe. Years later, while camped on a mesa, he met a young Paiute woman whom he wanted for his wife. Whether the Paiute girl objected to sharing his affections with another or whether he had tired of the "old wife," he discarded her. Later, they were reconciled and he established homes for the two women in the same dooryard.

Leslie Spier relates a story,* told him by Sinyella, the elderly tribesman, which helped me realize that not all broken marriages involved the heartache I had imagined.

While hunting on the mesa, Sinyella's father met a young Navaho woman, living in a brush shelter of her own contriving. She must have been a venturesome girl to have walked across the snow-covered desert from "away back there" to her camp site, searching for Navaho relatives whom she had heard were camped in this region. The girl had anticipated her need for a campfire by carrying the Indian's "slow match." This was made by rubbing cedar bark until soft and pliable, binding it with yucca leaves into a slender rope, and igniting one end. The rope was carried in a loose coil. By blowing on the smoldering end, fire could easily be lighted.

Sinyella's father wanted the girl and took her to his home as his wife. Years later, some Hopi men came into the canyon to trade. The woman slipped away to the Hopi village and became the wife of one of the visiting men. Her Havasupai husband followed, demanding her return. When the Hopi man refused to let the woman go, Sinyella's father stated his alternative: "You must give me something; then you can have her." The "some-

* *Havasupai Ethnography*, American Museum of Natural History.

132 slopes where storage granaries were located and where some families occupied caves and rock overhangs until 30 or 40 years ago. The humidity of the canyon makes the comparatively warmer temperatures there less bearable than those on the plateau. This, along with the scarcity of fuel, combined to make the plateau the favored winter abode.
[361]
[221]

137 Botanically, the plateau and the canyon floor represent the extremes within the Socorran Life Zone. On the plateau, clumps of juniper predominate along with stands of western yellow or ponderosa pine and pinyon pine. Nearer the canyons, trees give way to sagebrush, grasses, yucca, and a variety of wild food plants including mescal. Prickly pear, yucca, mescal, and some of the other food plants of the plateau,are also found on the Esplanade and at lower elevations. The change in vegetation is a gradual one from canyon rim to floor, with desert plants predominating at the lower elevations. Acacia and mesquite, Mormon tea, agave, prickly pear and other varieties of cacti, yucca, salt brush, and numerous grasses from which seeds were harvested, are found at elevations a few hundred feet above and below the
[372] canyon floor. Dense willow thickets border Havasu Creek, and this was the predominant fuel plant in the canyon until introduction of the cottonwood as a winter fuel source in early reservation days. Watercress in abundance and many flowering plants grow along the creek bottom and the irrigation ditches. Below the farm area, in places where the stream is impounded behind travertine terraces, cattail and other marsh plants abound, while only a few feet
[276] away the usual desert plants make a sharp contrast. Datura (jimson weed) is scattered everywhere in the canyon's sandy soil; the Havasupai have experimented with it as a narcotic but have rejected it.

133 Reservation farms occupy the canyon floor, which is 1/4 to 1/2 mi. in
361 width. Houses are located on individual farms throughout the area. Fields
312 lie on both sides of the creek, occupying about 140 acres of arable land. Fruit trees, still productive, and scars of abandoned fields mark an area below the village which, until about 20 years ago, was well populated. The canyon floor drops in elevation about 150 ft. from south to north in a distance of approximately 3 mi. in the cultivated area.

487 Cataract Canyon formerly was accessible from three directions by means of a half dozen horse trails and several foot trails which entered the canyon close to the village area. Although these old trails are sometimes used at present, the Havasupai more frequently travel the improved Topocoba and Walapai trails, which are used also for packing tourists and supplies into Supai.

245 Peach trees were introduced prior to 1876 (Whiting n. d., 59), and
177 the similarity of the Havasupai term for them to that of the Hopi demonstrates their Hopi origin (Spier 1946, 134). This refutes a popular notion that John D. Lee, a refugee Mormon, introduced peaches in comparatively recent times. Other orchard crops are pears, apricots, apples, both black and white figs.

may be used, but whichever one is chosen is used both for body paint and for face designs. However, one woman insisted that ocher paint only was used at the menses, and that the red opuntia dye was reserved as a treatment for sunburn and the removal of freckles. In the latter connection it was explained that freckles may be caused by a female fetus during pregnancy and can be remedied by the above treatment. (One informant thought that her fellow tribeswomen were in error in their belief that sex of a child could be foretold by the appearance of such freckles, inasmuch as she herself had seen them appear during a pregnancy which resulted in birth of a boy.) 881 302 [757] [827] [843] [842]

Designs on a girl's face may consist of four vertical lines on each side of her nose, extending from her forehead to her jaw, the innermost lines passing the outer corners of her eyes. Vertical lines may be painted on a girl's cheeks, with a continuous line extending from her hairline down her nose to her chin. One pattern started with a line at the inner corners of the eyes extending outward across the cheeks, the smoothing motion used in executing this supposedly warding off wrinkles. These, or other facial designs used, are said to have no significance other than that customarily associated with the number four which is conspicuous in any grouping of lines or dots used. The body may be painted red completely from neck to foot, or lines may be drawn on arms from shoulder to wrist and on the front of thighs to the knee. 881 302 531 [801]

While it was stated that a menstruating girl should rise before sunup for her ceremonial washing and painting so she will be ready to run at sunrise, a discrepancy appears in that she is said to dry her hair in the sun. This suggests that, in practice, little attention is paid to the time certain actions should be performed, or to their sequence. 881 302 841

Running at Sunset and Sundown

At sunrise, a pubescent girl, already bathed, shampooed, painted, and attired in her puberty dress, runs toward the sunrise, and at sundown she runs toward the west to insure that she will be quick and unfailing in her work. As she runs she carries a slow match of cedar bark with which she touches her knees and elbows to prevent rheumatism in old age. On the three succeeding days, a girl is bathed, her hair is shampooed, and her body paint and face designs are reapplied. As on the first day, she runs to the east at dawn and to the west at sundown. Following this routine she gathers a bundle of wood and carries it to the camp of some woman who is exemplary in working so that she may attain this ideal. 881 [751] [372] [482]

Meanwhile, a girl's father has dug a shallow pit and constructed a temporary brush shade over it a short distance from the home camp. In the pit, which is about 4 ft. long and 1 ft. deep, a layer of rocks is placed with firewood. After being heated about an hour, the rocks are covered with earth and several layers of blankets to make a bed. When the girl has performed 881 843